CONTACT DUPLICATING & RESEAU PRINTER

AND

HIGH RESOLUTION STEP & REPEAT PRINTER

THIRD MONTHLY LETTER REPORT

October 10, 1964

Period: September 1, 1964 to October 1, 1964

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1.0 CONTACT DUPLICATING AND RESEAU PRINTER

1.1 Purpose

The purpose of this effort is to design, fabricate, test and deliver in fifteen months a high-speed, maximum resolution, minimum distortion, Step and Repeat Duplicating and Reseau Printer. Results of the initial feasibility study will lead to a Design Plan, followed by fabrication, test and delivery of the final Printer. The deliverable equipment will be suitable for operational use. It will accommodate films of 70 mm to 9-1/2" in width with format lengths up to 30", and offer operation in the Reseau mode as an option.

1.2 Activity of this Report Period

Primary effort in this Report Period has been to update the Design Analysis Report and to review the various listed approaches to the problem areas with further development of those which appear most promising.

A breadboard unit has been fabricated and is now operational. On this framework, various film drive and transport systems are currently being evaluated. A means for achieving contact printing pressure is under test, and investigation of several light sources is under investigation. Film metering and frame sensing mechanisms are being tested, and sample Reseau grids are being printed for analysis. Various means for achieving automatic exposure control on a gross-area basis are being

analyzed and tested with the intent of delivering incremental variations in exposure correlated with negative film density. A meeting was held with the technical monitors in Washington on September 18, 1964 to view existing photographic equipment and to discuss automatic exposure control.

A meeting was held with the Industrial Design consultant to resolve details of machine configuration and human factors engineering. Controls, indicators, operator requirements, and safety devices were outlined with regard to the conceptual machine renderings being prepared for delivery to the monitors.

1.3 Plans for Next Report Period

The coming Report Period will be devoted to testing and analysis of the breadboard drive, transport, light source, metering, and sensing systems with the objective of selecting a recommended solution in each of the listed problem areas.

Design and development are progressing in the Pre-View and Punch Station with the objective of establishing an optimum means for viewing, a simplified format for punching, and a repeatable means for subsequent frame location. After a final configuration is selected, layout drawings will be generated for the coming Design Plan to be submitted. Concurrently with these developments, activity in Human Factors engineering, Industrial Design, environmental con-

trol, and RFI suppression design is progressing toward the Design Plan submission.

A Technical Review Meeting has been scheduled for October 8th to review current status and to obtain further technical information in some critical areas.

1.4 Problems

No major problems have appeared during the past month to cause program delays and none are anticipated during the coming month.

1.5 Documentation

The following list summarizes verbal agreements made with the technical monitors during a meeting held in Washington on September 18, 1964.

1. Means for testing Automatic Exposure Control are the responsibility of [ ] and will be specified in the Test Plan to be submitted later in the program. [ ] has the option to use a step-wedge rather than an aerial negative.

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2. It has been resolved that no RFI test will be required. It will be sufficient if the machine is designed and fabricated to the referenced RFI specification.

3. It has been resolved that a 500' spool capacity for negative and duplicating film will be adequate. Provision for 1000' spools is not required.

4. The problem of hole-slot-hole punching on one edge was discussed. When films are to be printed with emulsion "down"

instead of the normal "up" position, this fact will be determined beforehand, and the appropriate edge will be punched to coincide with the locator pin format at the printing station.

5. Negative frames will be masked so that any coded information printed on borders or between frames will be included. Masks will be larger than frame size, but small enough to prevent masking of adjacent frames.

2.0 HIGH RESOLUTION STEP AND REPEAT PRINTER

2.1 Purpose

The purpose of this effort is to design, fabricate, test, and deliver in twenty months a high-precision, Step and Repeat Photographic Contact Printer. This printer will be capable of producing photographic contact prints of the highest possible quality, resolution and acutance from roll films of width varying from 70 mm to 9-1/2" and in preselected frame lengths from 2-1/4" up to a maximum of 30".

The program will include a six-month Feasibility Study and Design Analysis, followed by a Breadboard Phase. Following design approval, a Prototype printer will be produced in accordance with the design plan.

2.2 Activity of This Report Period

2.2.1 Human Factors

A meeting with industrial design consultants, [redacted] STAT

STAT [redacted] has resulted in a purchase order for preliminary design and preparation of presentation drawings of the printer. The presentation material will be delivered to the contract monitor at the next engineering design review meeting. Human factors design liaison is continuing with other task leaders.

2.2.2 RFI and Power Distribution

The basic interference control plan remains unchanged. Close liaison with other task leaders is assuring selection of components and techniques to minimize RFI. Catalog information is being compiled for final selection of shielded devices and power supplies. A plan for the distribution of AC and DC power and fusing has been prepared. Basic power distribution and grounding philosophy have been determined.

2.2.3 Film Coding

Various codes which can be applied to film have been studied. Coding sensors and electronic logic circuitry are now under study for the best possible match between optimum coding techniques and machine requirements.

2.2.4 Control Panel

A list of operator controls and their descriptions have been prepared. These are continually being updated as the printer control circuitry and logic functions are being defined. Vendor data are being compiled and analyzed. Present plans are to provide a preliminary control panel configuration with the presentation drawings.

2.2.5 Film Gate

Vacuum gate techniques were reviewed and resolution transfer at gate pressures of 3,6, and 12 psi was confirmed experimentally. Resolution in excess of 400 lines per millimeter was obtained. The Newton fringe problem was studied as

related to films 4404, 8403, and 5427. A number of tests were made to determine precise location of fringes, and techniques were studied for their elimination. A continued series of techniques and experiments is being planned for the next period.

2.2.6 Exposure Control

An analysis was made of quantitative data for defining material parameter specifications, tone reproduction, resolving power, and over-and underexposure. An exposure control model has been derived and will provide single exposure reproduction so that a maximum of the negative content will be printed about the exposure of peak resolution of the duplicating material. A system equation was derived, and methods of implementation are being studied.

2.2.7 Film Handling

Film handling techniques described in patents, reports, and other literature were reviewed. Conceptual sketches of a variety of film handling configurations were prepared and reviewed with the project team.

Analysis of required film tension was implemented experimentally, and minimum tension values for conformity to spooling were obtained.

Dynamics of two most promising transport mechanisms are being studied for generalized systems. It is expected that analysis and design determination will apply to the final detailed design.

2.2.8 Illumination Source

Inquiries for performance data and characteristics have been sent to suppliers of arc discharge lamps of argon, deuterium, hafnium, helium, mercury, xenon and zirconium as well as fluorescent, luminescent, and plasma sources. As data are compiled, evaluation in terms of intensity level, reliability, uniformity, life and spectral compatibility with duplicating material, and ability to be modulated will be made.

2.3 Plans for Next Reporting Period

2.3.1 Continue feasibility study research and task analysis.

2.3.2 Deliver presentation material to customer at the next design review meeting.

2.3.3 Arrange for meetings to discuss film coding requirements.

2.4 Problems

2.4.1 Project personnel clearances still pending.

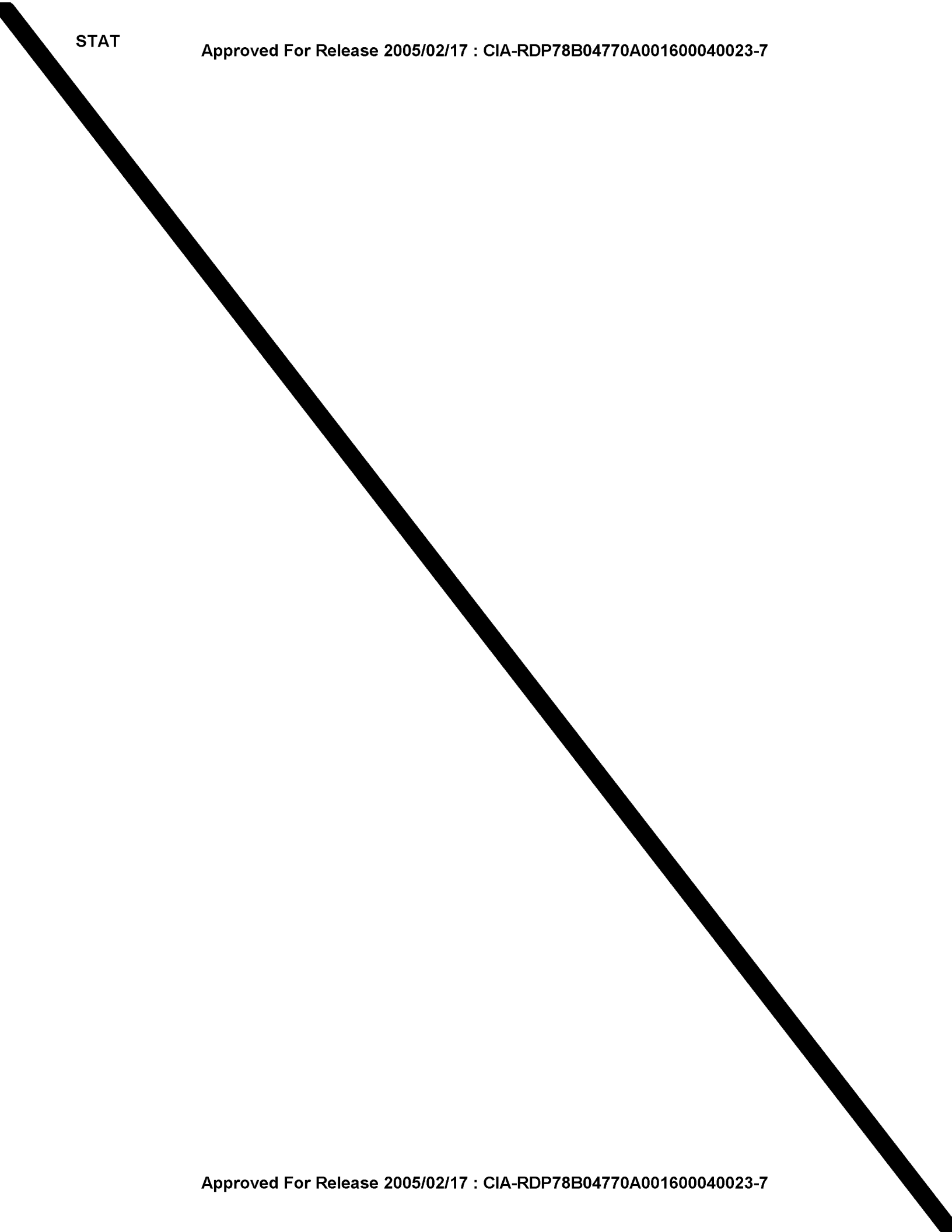
2.5 Documentation

There was no additional documentation during this reporting period.

2.6 Questions Outstanding

2.6.1 List of spool sizes to be furnished by the monitor.

2.6.2 Documents to be procured by the monitor.



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